

WE CLAIM:

1. A method of performing a medical procedure, comprising:  
providing a first electrode for supplying electrical current;  
5 positioning the first electrode adjacent a vagal nerve;  
providing a second electrode for supplying electrical current;  
positioning the second electrode adjacent a phrenic nerve;  
supplying electrical current to the first electrode to stimulate the vagal nerve to  
control heart rate; and  
10 supplying electrical current to the second electrode to stimulate the phrenic nerve  
to control breathing, wherein the supplying of electrical current to the first and second  
electrodes is coordinated.

2. The method of claim 1, wherein the first electrode is positioned  
15 through a thoracotomy.

3. The method of claim 1, wherein the first electrode is positioned  
through a sternotomy.

20 4. The method of claim 1, wherein the first electrode is positioned  
through a percutaneous port.

5. The method of claim 1, wherein the first electrode is positioned  
25 through a small incision.

6. The method of claim 1, wherein the second electrode is positioned  
through a thoracotomy.

7. The method of claim 1, wherein the second electrode is positioned through a sternotomy.

8. The method of claim 1, wherein the second electrode is positioned through a percutaneous port.

9. The method of claim 1, wherein the second electrode is positioned through a small incision.

10. The method of claim 1, wherein the first electrode is positioned in a trachea.

11. The method of claim 1, wherein the first electrode is positioned in an esophagus.

12. The method of claim 1, wherein the first electrode is positioned in a blood vessel.

13. The method of claim 12, wherein the blood vessel is an internal jugular vein.

14. The method of claim 1, wherein the second electrode is positioned in a blood vessel.

15. The method of claim 14, wherein the blood vessel is an internal jugular vein.

16. The method of claim 1 further comprising:  
administering at least one drug during the medical procedure.

17. A method of performing a medical procedure, comprising:  
providing a first electrode for supplying electrical current;  
positioning the first electrode adjacent a heart;  
5 providing a second electrode for supplying electrical current;  
positioning the second electrode adjacent a phrenic nerve;  
supplying electrical current to the first electrode to stimulate the heart to contract;  
and

supplying electrical current to the second electrode to stimulate the phrenic nerve  
10 to control breathing, wherein the supplying of electrical current to the first and second  
electrodes is coordinated.

18. The method of claim 1, wherein the first electrode is positioned through a  
thoracotomy.

19. The method of claim 1, wherein the first electrode is positioned through a  
sternotomy.

20. The method of claim 1, wherein the first electrode is positioned through a  
20 percutaneous port.

21. The method of claim 1, wherein the first electrode is positioned through a  
small incision.

22. The method of claim 1, wherein the second electrode is positioned through  
25 a thoracotomy.

23. The method of claim 1, wherein the second electrode is positioned through  
a sternotomy.

24. The method of claim 1, wherein the second electrode is positioned through a percutaneous port.

5                    25. The method of claim 1, wherein the second electrode is positioned through a small incision.

10                   26. The method of claim 1, wherein the first electrode is positioned in a trachea.

27. The method of claim 1, wherein the first electrode is positioned in an esophagus.

15                   28. The method of claim 1, wherein the first electrode is positioned in a blood vessel.

29. The method of claim 1, wherein the second electrode is positioned in a blood vessel.

20                   30. The method of claim 24, wherein the blood vessel is an internal jugular vein.

31. The method of claim 1 further comprising:  
administering at least one drug during the medical procedure.

25                   32. A system for performing a medical procedure, comprising:  
a nerve stimulator to inhibit beating of the heart;  
a phrenic nerve stimulator to control breathing; and

means for coordinated regulation of the output of the phrenic nerve stimulator and the output of the nerve stimulator to inhibit beating of the heart.

33. The system of claim 32 further comprising:

5 drug delivery means for delivering at least one drug during the medical procedure.

34. The system of claim 33 wherein the drug delivery means is selected from the group consisting of:

10 a spray, a cream, an ointment, a medicament, a pill, a patch, a catheter, a cannula, a needle and syringe, a pump, and an iontophoretic drug delivery device.

35. The system of claim 32 wherein the nerve stimulator to inhibit beating of the heart comprises at least one electrode.

15 36. The system of claim 35 wherein the electrode is selected from the group consisting of:

20 nerve stimulation electrodes, endotracheal electrodes, endoesophageal electrodes, intravascular electrodes, transcutaneous electrodes, intracutaneous electrodes, balloon-type electrodes, basket-type electrodes, umbrella-type electrodes, tape-type electrodes, suction-type electrodes, screw-type electrodes, barb-type electrodes, bipolar electrodes, monopolar electrodes, metal electrodes, wire electrodes, patch electrodes, cuff electrodes, clip electrodes, needle electrodes and probe electrodes.

25 37. The system of claim 32 wherein the phrenic nerve stimulator comprises at least one electrode.

38. The system of claim 37 wherein the electrode is selected from the group consisting of:

intravascular electrodes, patch-type electrodes, balloon-type electrodes, basket-type electrodes, umbrella-type electrodes, tape-type electrodes, cuff-type electrodes, suction-type electrodes, screw-type electrodes, barb-type electrodes, bipolar electrodes, monopolar electrodes, metal electrodes, wire electrodes, endotracheal electrodes, endoesophageal electrodes, transcutaneous electrodes, intracutaneous electrodes, clip electrodes, needle electrodes and probe electrodes.

39. The system of claim 32 wherein the medical procedure is selected from the group consisting of:

surgical procedures, non-surgical procedures, endoscopic procedures, fluoroscopic procedures, stent delivery procedures, aortic aneurysm repairs, cranial aneurysm repairs, delivery of drugs, delivery of biological agents, cardiac surgery with cardiopulmonary bypass circuits, cardiac surgery without cardiopulmonary bypass circuits, brain surgery, cardiograms, heart valve repair, heart valve replacement, MAZE procedures, transmyocardial revascularization, CABG procedures, beating heart surgery, vascular surgery, neurosurgery, electrophysiology procedures, diagnostic ablation of arrhythmias, therapeutic ablation of arrhythmias, endovascular procedures, treatment of injuries to the liver, treatment of the spleen, treatment of the heart, treatment of the lungs, treatment of major blood vessels, non-invasive procedures, invasive procedures, and port-access procedures.

40. The system of claim 32 wherein the means for coordinated regulation of the output of the phrenic nerve stimulator and the output of the nerve stimulator to inhibit beating of the heart is a processor.

41. A system for performing a medical procedure, comprising:  
a cardiac stimulator to adjust heart rate;  
a phrenic nerve stimulator to control breathing; and

means for coordinated regulation of the output of the phrenic nerve stimulator and the output of the cardiac stimulator.

42. The system of claim 41 further comprising:

5 drug delivery means for delivering at least one drug during the medical procedure.

43. The system of claim 42 wherein the drug delivery means is selected from the group consisting of:

10 a spray, a cream, an ointment, a medicament, a pill, a patch, a catheter, a cannula, a needle and syringe, a pump, and an iontophoretic drug delivery device.

44. The system of claim 41 wherein the cardiac stimulator comprises at least one electrode.

15 45. The system of claim 44 wherein the electrode is selected from the group consisting of:

20 cardiac stimulation electrodes, clip electrodes, needle electrodes, probe electrodes, pacing electrodes, epicardial electrodes, patch electrodes, intravascular electrodes, balloon-type electrodes, basket-type electrodes, tape-type electrodes, umbrella-type electrodes, suction-type electrodes, endotracheal electrodes, endoesophageal electrodes, transcutaneous electrodes, intracutaneous electrodes, screw-type electrodes, barb-type electrodes, bipolar electrodes, monopolar electrodes, metal electrodes, wire electrodes and cuff electrodes.

25 46. The system of claim 41 wherein the phrenic nerve stimulator comprises at least one electrode.

47. The system of claim 46 wherein the electrode is selected from the group consisting of:

intravascular electrodes, patch-type electrodes, balloon-type electrodes, basket-type electrodes, umbrella-type electrodes, tape-type electrodes, cuff-type electrodes, suction-type electrodes, screw-type electrodes, barb-type electrodes, bipolar electrodes, monopolar electrodes, metal electrodes, wire electrodes, endotracheal electrodes, endoesophageal electrodes, transcutaneous electrodes, intracutaneous electrodes, clip electrodes, needle electrodes and probe electrodes.

48. The system of claim 41 wherein the medical procedure is selected from the group consisting of:

surgical procedures, non-surgical procedures, endoscopic procedures, fluoroscopic procedures, stent delivery procedures, aortic aneurysm repairs, cranial aneurysm repairs, delivery of drugs, delivery of biological agents, cardiac surgery with cardiopulmonary bypass circuits, cardiac surgery without cardiopulmonary bypass circuits, brain surgery, cardiograms, heart valve repair, heart valve replacement, MAZE procedures, transmyocardial revascularization, CABG procedures, beating heart surgery, vascular surgery, neurosurgery, electrophysiology procedures, diagnostic ablation of arrhythmias, therapeutic ablation of arrhythmias, endovascular procedures, treatment of injuries to the liver, treatment of the spleen, treatment of the heart, treatment of the lungs, treatment of major blood vessels, non-invasive procedures, invasive procedures, and port-access procedures.

49. The system of claim 41 wherein the means for coordinated regulation of the output of the phrenic nerve stimulator and the output of the cardiac stimulator is a processor.

50. A system for performing a medical procedure, comprising:  
a nerve stimulator to inhibit beating of the heart;



a cardiac stimulator to stimulate beating of the heart; and  
means for coordinated regulation of the output of the cardiac stimulator and the  
output of the nerve stimulator.

5                    51.    The system of claim 50 further comprising:  
                         drug delivery means for delivering at least one drug during the medical  
procedure.

10                   52.    The system of claim 51 wherein the drug delivery means is selected from  
the group consisting of:

                         a spray, a cream, an ointment, a medicament, a pill, a patch, a catheter, a  
cannula, a needle and syringe, a pump, and an iontophoretic drug delivery device.

15                   53.    The system of claim 50 wherein the nerve stimulator comprises at least  
one electrode.

                         54.    The system of claim 53 wherein the electrode is selected from the group  
consisting of:

20                   nerve stimulation electrodes, endotracheal electrodes, endoesophageal  
electrodes, intravascular electrodes, transcutaneous electrodes, intracutaneous electrodes,  
balloon-type electrodes, basket-type electrodes, umbrella-type electrodes, tape-type  
electrodes, suction-type electrodes, screw-type electrodes, barb-type electrodes, bipolar  
electrodes, monopolar electrodes, metal electrodes, wire electrodes, patch electrodes, cuff  
electrodes, clip electrodes, needle electrodes and probe electrodes.

25                   55.    The system of claim 50 wherein the cardiac stimulator comprises at least  
one electrode.

56. The system of claim 55 wherein the electrode is selected from the group consisting of:

cardiac stimulation electrodes, clip electrodes, needle electrodes, probe electrodes, pacing electrodes, epicardial electrodes, patch electrodes, intravascular electrodes, balloon-type electrodes, basket-type electrodes, tape-type electrodes, umbrella-type electrodes, suction-type electrodes, endotracheal electrodes, endoesophageal electrodes, transcutaneous electrodes, intracutaneous electrodes, screw-type electrodes, barb-type electrodes, bipolar electrodes, monopolar electrodes, metal electrodes, wire electrodes and cuff electrodes.

57. The system of claim 50 further comprising:  
a respiratory controller for controlling respiration.

58. The system of claim 57 wherein the respirator controller comprises at least one electrode.

59. The system of claim 58 wherein the respirator controller comprises a connector which interfaces with a patient's respirator.

60. The system of claim 50 wherein the medical procedure is selected from the group consisting of:

surgical procedures, non-surgical procedures, endoscopic procedures, fluoroscopic procedures, stent delivery procedures, aortic aneurysm repairs, cranial aneurysm repairs, delivery of drugs, delivery of biological agents, cardiac surgery with cardiopulmonary bypass circuits, cardiac surgery without cardiopulmonary bypass circuits, brain surgery, cardiograms, heart valve repair, heart valve replacement, MAZE procedures, transmyocardial revascularization, CABG procedures, beating heart surgery, vascular surgery, neurosurgery, electrophysiology procedures, diagnostic ablation of arrhythmias, therapeutic ablation of arrhythmias, endovascular procedures, treatment of

injuries to the liver, treatment of the spleen, treatment of the heart, treatment of the lungs, treatment of major blood vessels, non-invasive procedures, invasive procedures, and port-access procedures.

- 5                    61.     The system of claim 50 wherein the means for coordinated regulation of the output of the cardiac stimulator and the output of the nerve stimulator is a processor.